Raman Spectroscopy of Graphene Biosensors

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Graphene has shown how valuable it is as a sensing material in a wide variety of applications including its use as a back-gated channel material in field effect transistors (FETs) optimised to detect Human Chorionic Gonadotrophin Cancer risk biomarkers [1]. Graphene based biosensors aim to utilise the material's sensitivity, linear current-voltage (I-V) characteristics and biocompatibility for the next generation of early detection screening devices [2, 3]. One of the major barriers to widespread development of this material is the difficulty in obtaining it as a single atomically flat layer free of dopants [4]. Raman spectroscopy offers a non-destructive, un-ambiguous, high throughput technique to acquire vital characteristics of graphene in order to optimise these parameters for sensing applications [5]. Raman spectroscopic techniques and analysis are presented that can be used to uncover characteristics of graphene FET biosensors fabricated in-house. By using these techniques, information about the fabrication and handling techniques that it has been exposed to can be uncovered and subsequently improved. Funding is acknowledged from the University of Plymouth GD110025-104.

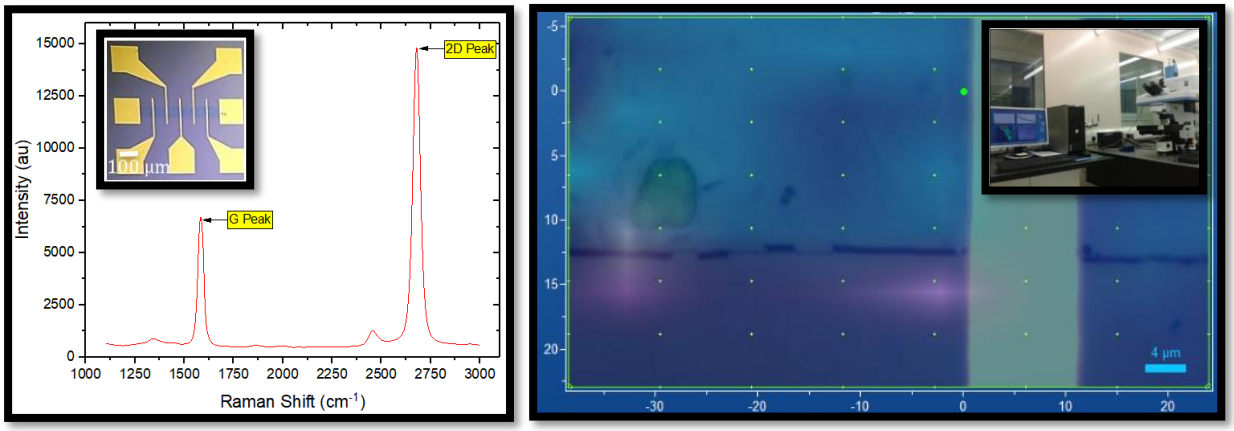

Fig. 1. Raman spectrum of graphene with inset showing fabricated transducers (left) and Raman map showing superimposed ratio of 2D to G peaks across the sample area with inset showing bench-top Horiba XPLORA system (right).

References

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